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ABSTRACT

This module, the second of four units about vocational competency measurement, is module 18 in the Vocational Education Curriculum Specialist series. The purpose stated for the document is to help vocational educators determine the specific job-related competencies that need to be tested. Content is organized into two sections, each of which focuses on one goal and two or more objectives. Section 1 describes the necessary steps for systematically determining requirements for vocational competency measures, including involvement of expert advisors, collection of job and task information for a specific occupation, and verification of task importance. Section 2 focuses on listing task priorities on the basis of which existing competency measures will be reviewed or new measures will be developed. Each section concludes with individual study activities, discussion questions, and group activities. Self-check items and possible responses to them are appended for use as a pretest and review of the module content. (YLB)

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ED227354

DETERMINING REQUIREMENTS FOR VOCATIONAL COMPETENCY MEASURES

Module 18

Jeanette D. Wheeler

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
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ACKNOWLEDGMENTS

The discussions and techniques presented in Modules 17 through 20 of the VECS series are based on the work of the American Institutes for Research in carrying out the Vocational Competency Measures (VCM) project under contract with the Office of Vocational and Adult Education, U. S. Department of Education. The project was a major effort, beginning in October 1979 and continuing through 1982, to provide a national model for vocational competency test development.

The VCM project had four major objectives:

(1) To develop competency tests in selected occupations, representing each of the seven major areas: trade and industry, home economics, health, distributive education, technical, business and office, and agriculture;

(2) To establish their usefulness through extensive field testing and evaluation;

(3) To promote their acceptance and use in vocational education programs;

(4) To design and help implement a program for continuing occupational competency test development on a self-supporting basis.

The successful implementation of the project was due to the efforts of many people. Senior project staff responsible for specific tasks were:

Dr. Albert B. Chalupsky, Project Director
Ms. Marion F. Shaycoft, Director of Sampling and Test Quality Control, and Test Team Leader
Dr. Malcolm N. Danoff, Director of Field Coordination and Validation
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Mr. Steven Zwillinger, Department of Education Project Officer, provided support to staff throughout the project.

Introduction

This module is one of four developed to help vocational educators in state and local education agencies select, develop (or adapt), and effectively use vocational competency measures. The previous module, Module 17, provided an overview of using competency measures in vocational education programs. The next module, Module 19, presents a step-by-step approach to developing the competency tests, and Module 20 considers approaches to validating competency tests and using test results.

Competency testing emphasizes the practical aspects of a job--can the student perform job-related tasks at the level expected by prospective employers? The purpose of this module is to help you arrive at the specific job-related competencies that need to be tested. The discussion presented here is based on the experiences of the American Institutes for Research in conducting the Vocational Competency Measures (VCM) project for the U.S. Department of Education.

Overview

Before jumping into the development of a competency test, we're assuming that you've identified a need for testing a particular program. For example, maybe the electronics technician programs in your district or state appear to be effective and there seems to be a great potential for the future employment of graduates. But, the levels of the graduates' skills and knowledge, according to local employers, seem to be uneven. Is there any way you can assure the employers that the students completing your programs have achieved a specific measured standard of performance?

We feel that vocational competency testing may be the answer and that this set of modules will help you resolve your dilemma. There are, of course, other reasons for using vocational competency measures, as discussed in the first module of this series. The first module, Using Competency Measures in Vocational Education Programs, defines competency testing and discusses the ways such measures can be used in vocational education programs. Competency tests are not new nor are they restricted to occupational training. Most of us, for example, have taken the written and driving tests required to obtain drivers' licenses. Those tests measured whether we could perform certain tasks and had specific knowledge at a level high enough to meet predetermined standards. Using lists of safety standards and the laws regulating traffic, states have developed their competency measures for drivers.

This module should assist you in setting standards and priorities--your list of competencies for job-related tasks. The following sections can also help you determine how adequate existing measures are or provide the first steps for developing your own measures. Then, if you decide to build a competency test, you should be ready to use the last two modules, Developing Vocational Competency Measures, and Validating Competency Tests and Using Test Results.

There is no question that the objective measurement of occupational competency is becoming increasingly important in our technological society. All four modules stress the development and use of competency measures to improve vocational programs for the benefit of future employees and their employers.

Instructions to the Learner

The Self-Check items and possible responses to them are found in the Appendices. These questions have two purposes. First, before you begin work on the module, you may use them to check quickly whether you have already learned the information in previous classes or readings. In some instances, with the consent of your instructor, you might decide to skip a whole module or parts of one. The second purpose of the Self-Check is to help you review the content of modules you have studied in order to assess whether you have achieved the module's goals and objectives.

You can also use the list of goals and objectives that follows to determine whether the module content is new to you and requires in-depth study, or whether the module can serve as a brief review before you continue to the next module.

Goals and Objectives

Goal 1: Perform the necessary steps for systematically determining requirements for vocational competency measures.

Objective 1.1 Involve expert advisors throughout the development of competency lists.

Objective 1.2 Collect and list job and task information for a specific occupation.

Objective 1.3 Verify the task statements listed on a comprehensive task inventory.

Goal 2: On the basis of identified task priorities, list specific competencies for reviewing and developing competency tests.

Objective 2.1 Analyze the data to determine priorities among tasks.

Objective 2.2 Revise the list of task statements and develop an outline of specific competencies.

Objective 2.3 Use the list of competencies to review existing vocational competency measures.

Resources

In order to complete the learning activities in this module, you will need information contained in the following publication:

Erickson, R. C., & Wentling, T. L. Measuring student growth: Techniques and procedures for occupational education. Urbana, Ill.: Griffon Press, 1976.

GOAL 1: Perform the necessary steps for systematically determining requirements for vocational competency measures.

How Do You Determine What To Measure?

This module describes a step-by-step process for determining requirements for vocational competency measures. The outcome of this process should be a preliminary set of competencies for a specific occupation. The list of competencies can then be used to help you decide whether to (1) use an existing test as it stands, (2) modify an existing test, or (3) develop your own test.

Enlist the Aid of Your Strongest Allies

A range of individuals should be involved from the earliest decisions about competency testing to the final rounds of updating tests and using the results for program improvement. Employers are especially important, of course, because they hire the people you train. But, equally important to test development and use, is the employers' help in job and task analysis--the basic building block for developing and evaluating vocational education programs.

In developing the AIR Vocational Competency Measures, we asked for help nationwide from a variety of groups with an interest in vocational education and a concern for preparing students for successful entry into jobs. Individuals from these groups became members of our advisory panels, resources for locating existing competency measures and task analysis lists, and reviewers and authors of test items.

Most likely you will draw upon representatives of the same agencies and organizations in your state or region, including the following:

- Vocational teachers and administrators (secondary, postsecondary, and proprietary schools)
- Business and industry (both small and large employers)
- Unions and apprenticeship representatives
- State and local advisory committees for vocational training programs

- State agency staff and occupational specialists
- Professional association leaders

Your advisory committee should be a working committee, individuals who are committed to improving vocational education, knowledgeable about the selected occupational areas, and willing to work the necessary hours for several months. It is especially important that the committee include individuals who provide insights into the special needs of minorities, limited-English speaking groups, women, and the handicapped.

Working with advisory committees. There is no magic formula for working efficiently with advisory groups. Someone has to be in charge, starting with selecting the committee and then making sure that the following requirements are carried out:

- regular meeting times
- organized agendas
- clearly spelled-out responsibilities--group and individual
- time limits on reviewing materials and information
- open and consistent communications by mail and phone regarding deadlines, accomplishments, problems
- appropriate recognition for each individual's efforts

Once you've selected an advisory committee to help you on the way to competency testing, the next step is to analyze the specific job to be tested. The key question to keep in mind throughout the next step is:

> What's important for vocational program graduates to know and be able to do before they enter a specific job market?

Collect Job and Task Information

What kinds of job information exist and how can they be used? Job information is useful in helping you identify job components and document the duties and tasks performed by employees. The questions asked in analyzing any job are:

- What does the worker do?
- How does the worker do it?
- Why does the worker do it?
- What skills does the worker require to do it?

Most likely, you will not be conducting a full-scale job analysis; rather, you will be deriving a list of duties and tasks from job analyses already done by others. A job analysis usually includes the following:

1. A general description of the work to be done;
2. The organizational setting and relationships in which the work is accomplsihed;
3. The specific tasks that are to be carried out by the worker;
4. The equipment, tools, and materials to be used;
5. The working conditions, including special hazards;
6. The qualifications required to learn and to perform these tasks stated in terms of knowledge, skills, abilities, and personal characteristics;
7. The expected manner or quality of performance;
8. The process and expected outcomes of the performance.

The work of breaking down an existing job analysis is not as overwhelming as it may seem at first glance. To simplify the process, the primary focus should be on the third item--the specific tasks; however, all of the above elements will be useful.

The employer members of your advisory committee are probably the best source of information about the tasks that make up the selected job. Other sources that can be tapped for job and task information include the Department of Labor, trade and professional associations, and the Department of Defense. (See the Appendices for a listing of references and information sources.)

Before going any further, we should define what we mean by a task. Simply stated, a task is a distinct action that is observable and measurable, with a specific purpose and a clear beginning and

ending. Figure 1 below illustrates the relationship between duties (broad descriptors) and tasks (specific descriptors). Constructing a task inventory is much easier if you use major duties as headings, and then group related task statements under those headings.

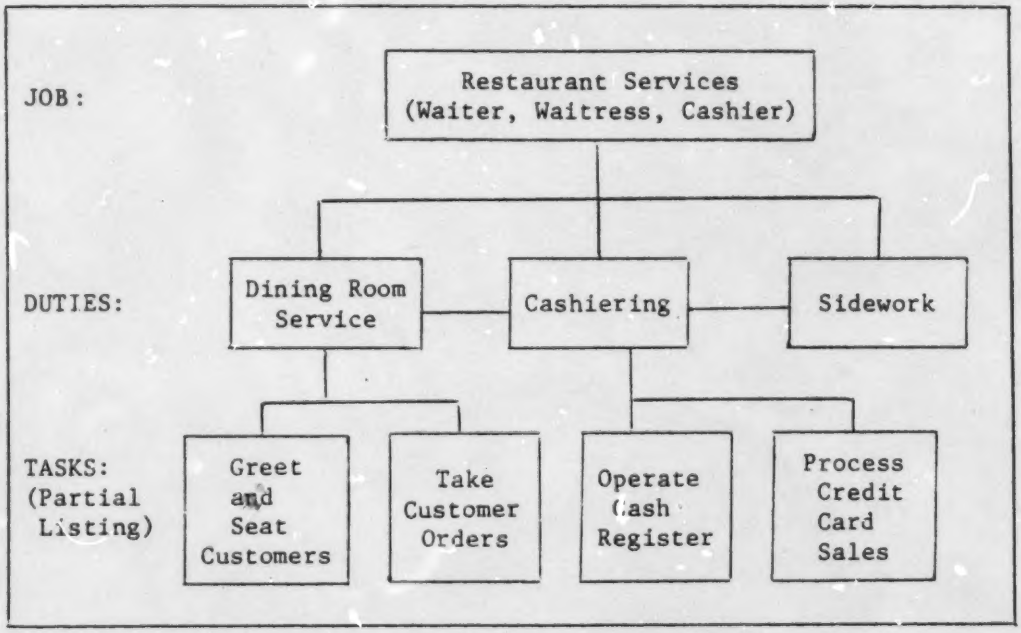

Figure 1. Example of relationship between job, duties, and tasks

Develop a Task Inventory

The easiest way to develop a comprehensive task inventory is to use what's available and build from that point. After you've amassed everything you can find about a job, then you and your committee need to consolidate the information into a task inventory. This inventory should become a comprehensive listing of basic task statements that will be reviewed, revised, and refined into a set of task priorities for the selected job.

Fill in the gaps on your task inventory using information from curriculum guides and from your advisory members. Remember, at this point, it's better to have too many tasks listed than too few. It's usually easier for expert reviewers of this preliminary task (e.g., employers) to eliminate irrelevant items than to conjure up tasks that should be included.

> The best information for choosing, adapting, or constructing a job-related test is a comprehensive set of task statements that accurately reflect current job requirements.

Writing task statements. Any job can be described by task statements listed as a series of distinct activities that make up the necessary steps for performing the job. Most jobs consist of interdependent tasks that must be done in proper sequence in order for the job to be completed satisfactorily.

Once you've consolidated the task statements from your review of existing task analyses, revise the statements to be sure that the levels of effort are comparable. Of course, all statements must be written so that they are clear, simple, and easy to understand. This means you must strike a balance between statements that are too vague and those that are too detailed.* On a list of tasks for a custom sewing test, for instance, "threads a needle" is overly specific; "tailors a suit" is too broad. The following are examples of balanced task statements.

Examples of Task Statements

Action Verb	Object	Qualifying Phrase
Measures	the water sample	using the appropriate test instrument
Verifies	credit payments	by phoning to obtain credit information

*Module 8, Conducting Task Analyses and Developing Instructional Objectives, discusses in detail the development of task statements.

Keep the following points in mind during your revision:

- A task statement begins with an action verb to indicate what a person does on the job. This is usually an observed behavior.
- The action verb is followed by an object--the thing or person receiving the action.
- The object may be followed by a qualifier--to make the task more specific, describe the expected outcome, or to detail the tools or equipment used to carry out the task.

Verify Task Importance

Verify the importance of each task by surveying employers. The task inventory you've compiled can be used as a job-specific questionnaire written in the "language" of the job. As shown in the following partial task inventory for Restaurant Service, related tasks are grouped under functional headings that represent duties. Similar questionnaires for each of the tests we developed were administered to employers and employees nationwide.

Ask your advisory committee to nominate local and state businesses, naming supervisors they feel would cooperate in completing task inventory questionnaires. It is best to work with a range of employers, particularly middle-size businesses. We found that, in general, middle-size companies were often good candidates for cooperative surveys because they appreciate the value of such work, but do not have the resources for conducting the analyses.

In addition to obtaining employer ratings on the frequency that each task is performed and the relative importance of each task, ask employees working in the specific job area for the same information. Both groups should respond to the question about whether each task should be learned before employment (i.e., in a training program) or on the job. The last page of the task inventory asks respondents for the personal qualifications they think are important in order to do the job, and to rank the 10 tasks most critical to the job.

Other methods for gathering and verifying task information. As shown in Table 1, there are several ways to check whether the tasks listed in your task inventory are accurate, complete, in proper sequence, and easy to understand. The choice of methods depends on the available amount of time and money and the number of people you have to carry out the verification process. Sometimes the careful review of a task inventory list by a small group of experts representing the range of employers that typically hire your graduates can yield as much good advice as a widespread, expensive survey.

TASK INVENTORY FOR RESTAURANT SERVICE (WAITER, WAITRESS, CASHIER)

Background Information

Job Title: _____ Employer: _____

Highest education grade completed: _____ Age: ___ Sex: ___ Years of experience in present work: _____

Special courses completed for present work
(include apprenticeship or military courses): _____

_____

Task List

Instructions

The following list of tasks may be performed by persons who work in restaurant service (waiter, waitress, cashier) jobs. We would like to know which tasks are performed on this job, how often they are performed, how important they are on the job, and when they should be learned (before or after entry to the job).

1. How often is the task performed on this job?

   NOT DONE if the task is not required. (NOTE: If the task is not required, do not answer other questions about the task.)
   WEEKLY if the task is performed once a week, daily, or more often.
   MONTHLY if the task is performed about once a month.
   QUARTERLY if the task is performed about every three months or less often.

2. How important to the overall job is each task?

   HIGH if the task has high importance, is an essential part of the job, and definitely influences effectiveness of job performance.
   MODERATE if the task has moderate importance, contributes to the job, but the job doesn't depend on it.
   LOW if the task is of low importance and does not contribute much to the job.

3. Is the worker required to perform the task upon entry to the job or is it learned on the job?

   BEFORE if most of the task should be learned before entry to the job.
   AFTER if most of the task should be learned after entry to the job.

GENERAL TASKS:	Frequency				Importance			Should Be Learned	
	NOT DONE	WEEKLY	MONTHLY	QUARTERLY	HIGH	MODERATE	LOW	BEFORE	AFTER (Entry to Job)
1. Help maintain dining room appearance	___	___	___	___	___	___	___	___	___
2. Handle customer complaints	___	___	___	___	___	___	___	___	___
3. Report equipment needing repairs	___	___	___	___	___	___	___	___	___
.			.			.			.
.			.			.			.
.			.			.			.

	Frequency				Importance			Should Be Learned	
	NOT DONE	WEEKLY	MONTHLY	QUARTERLY	HIGH	MODERATE	LOW	BEFORE	AFTER (Entry to Job)
DINING ROOM SERVICE:									
9. Make reservations/ waiting lists	—	—	—	—	—	—	—	—	—
10. Greet and seat guests	—	—	—	—	—	—	—	—	—
11. Provide menus and answer inquiries about menu items	—	—	—	—	—	—	—	—	—
12. Suggest menu items	—	—	—	—	—	—	—	—	—
13. Take guests' orders and turn in orders	—	—	—	—	—	—	—	—	—
14. Load and carry trays	—	—	—	—	—	—	—	—	—
15. Serve courses in correct sequence.	—	—	—	—	—	—	—	—	—
.			.			.			.
.			.			.			.
.			.			.			.
48.	—	—	—	—	—	—	—	—	—
49.	—	—	—	—	—	—	—	—	—
CASHIERING:									
50. Prepare cash drawers	—	—	—	—	—	—	—	—	—
51. Accept payments	—	—	—	—	—	—	—	—	—
52. Operate cash register	—	—	—	—	—	—	—	—	—
53. Write and add checks (tabs)	—	—	—	—	—	—	—	—	—
54. Process credit card sales	—	—	—	—	—	—	—	—	—
55. Authorize customers' checks and process	—	—	—	—	—	—	—	—	—
56. Compute tax	—	—	—	—	—	—	—	—	—
57. Verify cash in drawer	—	—	—	—	—	—	—	—	—

ADDITIONAL INFORMATION

A. Name some personal qualities that are important in order to do this job? (Example: Being dependable)

_____

_____

_____

Name work habits (Example: Start work on time) _____

_____

_____

Name interpersonal relations (Example: Accept supervisor's suggestions) _____

_____

_____

B. Could important parts of this job be done by persons who are:

Physically handicapped? _____ Blind or visually impaired? _____

Deaf or hearing impaired:? _____ Mentally retarded? _____

Do you know or have you heard of a person with some kind of handicap who successfully performs this job:

Yes _____ No _____

Describe the handicap and any modifications to the job.

C. Look back over the entire list of tasks, including those that you might have added. Select up to 10 tasks that you feel are most critical to the job and circle the numbers in front of each task.

TABLE 1

METHODS FOR GATHERING AND VERIFYING JOB AND TASK INFORMATION

Methods	Procedures	Advantages	Disadvantages
Interviewing Workers and Supervisors	Use a general interview guide or a guide developed for a specific job. Call or visit employers/employees to ask what the employee does, what machines and materials are used, which tasks are most critical and how often they are done.	Easy to probe for answers, particularly regarding attitudes, and personal qualifications. Unclear or ambiguous responses can be clarified.	Time consuming and expensive to obtain large number of respondents.
Using Questionnaires (including Task Inventory Lists)	Develop a questionnaire around the comprehensive list of tasks compiled to make up a job description. Use scales for frequency of task performance and importance of each task. Make sure questions are brief and easy to read and understand. Leave room for additional comments from respondents. Be sure questionnaire format allows for easy data analysis.	Least expensive way to obtain first-hand information from actual job sites, including employers and employees. Efficient method for gathering large amount of job information.	Uses employer/employee time for completion. May require follow-up by mail or phone for complete information. Requires time for analyzing data.
Observing Job Performance On Site	Develop a checklist before the actual observations, listing the general task categories expected to be observed. Observe the entire work cycle on site, listing the job behaviors, equipment used, and sequence of tasks.	Best method for clarifying unclear procedures for carrying out a specific job. Out-of-date documentation of tasks can be updated on site.	Time consuming and relatively expensive, depending on the number of sites visited.
Reviewing Documents (including logs or journals of typical work days)	Review literature/documents describing a specific job, and consolidate the information in logical sequence under major duty headings. Use information to develop task inventories, interview guides, and observation checklists.	Good way to fill in gaps from observations on site, and to prepare preliminary task inventory lists. Least expensive method.	Information may be outdated or lacking for new and emerging occupations.

Individual Study Activities

1. Select an occupation with which you are familiar, preferably one in which you have worked. Write a brief job description by listing the general duties, most important tasks, and special working conditions, tools, etc., for carrying out the tasks. Refer to the Recommended References in this module or one of your own resources for information on writing job descriptions. Then compare your description with the job description in the Dictionary of Occupational Titles (DOT) for the occupation you selected.

2. Read at least one chapter of a text from the Recommended Reference list that pertains to task inventories--(a) their development, use, or verification; (b) the relationship to job analysis or competency measurement; or (c) their use in curriculum development. Summarize your reading and share the information with the class. The various readings by class members should allow the identification of at least four different approaches to organizing and conducting task analyses.

Discussion Questions

1. Using community employers effectively as advisors in helping you develop competency measures requires tactful leadership and efficient management. Discuss the advantages and some of the problems that can arise when working with employers. How would you, as vocational educators, go about selecting and managing an advisory group for developing a competency test?

2. Discuss the advantages and disadvantages of using existing job and task analyses for developing a particular competency test for use in your district or state. Consider whether factors such as regional differences, state licensing, trade practices, mandated curricula, etc., could affect the use of any existing task analysis. What modifications might need to be made to adapt task statements to your circumstances?

Group Activities

1. Depending on the size of the class, form groups to roleplay an advisory committee. Each group member should assume a role that represents the categories listed on pages 9 and 10 under Goal 1. The groups should then select a chairperson, set an agenda for the meeting, assign responsibilities and due dates for activities, etc. The main purpose of each group should be to establish a working relationship with the goal of selecting a single occupation for which competency measures will be developed.

2. Divide the class into four groups, with each group selecting a method presented in Table 1 on page 18 for gathering and verifying information. Either use an existing task inventory or develop a task inventory for a specific occupation to carry out the procedures described in Table 1. Whenever possible, verify the tasks with actual employers in the community.

GOAL 2: On the basis of identified task priorities, list specific competencies for reviewing and developing competency tests.

What Do You Do With All the Information?

At this stage, you most likely have gathered job information from a variety of sources and used several methods to collect data. To summarize the steps we used to arrive at this point:

- Select and meet regularly with your advisory committee.
- Collect all available task analysis information for the selected occupation.
- Consolidate existing information into a comprehensive task inventory.
- Verify the task statements with employers and workers by questionnaires, interviews, or observations on the job.
- Collect information about task importance and frequency of performance for use in selecting tasks to include in the tests. Information on task difficulty, critical factors in task performance, and criteria for judging adequacy of performance will provide useful background information for item development.

The checklist on the following page will give you a quick look at what you've accomplished and at the steps that are still to come. The next step is to analyze the information to identify the tasks that will be used in developing a competency test.

Analyze the Data

The actual analysis of data about the frequency and the importance of each task performed can be a simple tabulation or can involve complex statistics. We suggest the former! Remember that your final list of competencies should include all tasks that are judged by most supervisors and their employees to be (1) important to the overall job, and (2) performed frequently by most "entry-level" workers, those beginning employees who have already received some training for a specific occupation.

CHECKLIST FOR DETERMINING COMPETENCIES TO BE MEASURED

	Planned (Date)	Completed (Date)	Person(s) Responsible
1. Develop Initial Task Inventory (Obtain recommendations, existing lists from)			
Advisory committee			
Employers			
Skilled workers			
Related job and task inventories, textbooks, etc.			
2. Develop Task Inventory Survey Questionnaire			
Group related tasks under duties			
Develop scale for rating importance of tasks			
Develop scale for rating frequency of task performance			
Request ratings on critical tasks			
3. Conduct Task Inventory Survey			
Survey supervisors and their employees using questionnaire			
Conduct surveys of a small sample of similar employers			
4. Analyze Survey Data			
Average frequency data across all supervisors and across all employees			
Average importance ratings across supervisors and across employees			
Weight supervisor responses and obtain overall rating for each task			
5. Determine Task Priorities			
Delete tasks rated not done or unimportant			
Group remaining tasks under outline of major duty headings			
Ensure that tasks judged as critical are included			
Obtain expert review of revised list of competencies			
6. Review Existing Tests			
Check titles of available competency measures (FL, NOCTI, Buros, etc.)			
Compare list of task priorities with available tests, noting gaps, comprehensiveness, etc.			

Let's assume that you have sent task inventories to several hotel managers with the request that they rate the frequency and importance of each task on the list. The following are parts of a task inventory questionnaire returned to you by a supervisor of hotel front-desk employees. The supervisor has circled the critical tasks and checked the appropriate columns.

TASKS	FREQUENCY				IMPORTANCE			
General Tasks	Not Done	Daily or Weekly	Monthly	Seldom or Quarterly	High	Moderate	Low	
(1) Greet guests		√(3)			√(4)			=7
2 Arrange tours for guests				√(1)			√(0)	=1
3 Schedule shifts for desk clerks	√(0)							=0
Processing Guests								
35 Verify guest reservations		√(3)			√(4)			=7
36 Arrange payments from guests		√(3)			√(4)			=7
(37) Check out guests		√(3)				√(2)		
(38) Follow up unpaid bills			√(2)			√(2)		=4

Your first step would be to assign a numerical rating to each column. As shown above, we assigned "0" for "Not Done"; "3" for "Daily/Weekly"; "2" for "Monthly"; "1" for "Seldom/Quarterly." Then, the checks for "Importance" were weighted to ensure that essential tasks would not be deleted if they were performed less often. That is, checks in the "High" column received a "4"; "Moderate," a "2"; and "Low," a "0." The numbers were summed across each item and each total was recorded. As you can see, "7" was the maximum total any item could receive. We used the same procedure and scales for the task inventory questionnaires completed by employees on the job.

As stated earlier, supervisors and employees were also asked to circle the 10 tasks on the inventory they felt were most critical to job performance. Judgments of criticality provide a good way to verify task importance ratings. For example, we found that about 60% of the tasks on all our inventories that received a total rating of "5" or higher were also judged as "critical" by both supervisors and their employees.

Next, we summarized all the ratings from all respondents on a sheet similar to the following example:

TASKS

General Tasks	Salience, Supervisors (Average)	Salience, Employees (Average)	Critical (at least one mention)	Overall Rating (Supervisors and Employees)
1 Greet guests	7.0	7.0	11	7.0
2 Arrange tours for guests	2.8	0	-	1.9
3 Schedule shifts for desk clerks	2.3	1.0	-	1.9
Processing Guests				
35 Verify guest reservations	6.0	6.6	8	6.2
36 Arrange payments from guests	7.0	7.0	12	7.0
37 Check out guests	6.3	6.4	11	6.3
38 Follow up unpaid bills	4.0	1.0	-	3.0

Averages were computed for the total number of supervisors and for the total number of employees responding to each item. We wanted to give greater weight to the ratings of supervisors and still include tasks rated very high by employees but only moderately high by supervisors. Therefore, we used the following formula to arrive at an overall rating for each of the tasks:

$$R = \frac{2S + E}{3}$$

R = overall rating
S = supervisors' average
E = employees' average

For example, supervisors gave an average response of 6.0 to Item 35, Verify Guest Reservations; on the same 7-point scale, employees

rated it 6.6. Using the formula, we would have

$$R = \frac{2(6) + 6.6}{3} = \frac{12 + 6.6}{3} = \frac{18.6}{3} = 6.2.$$

When this is done for each item on the inventory questionnaire, the result is a list of tasks and their weighted importance.

In addition to determining the importance, frequency, and criticality of each item on the comprehensive task inventory, it would be helpful to check whether each task should be learned before or after entry on the job. Again, we suggest giving the greatest weight to the supervisors' responses. For example, if two-thirds or more of the supervisors felt that diesel mechanics should learn to check turbochargers on the job and not in school, we would question whether that task should be included on a performance test for students. Questions of this type are probably best solved by asking advisory committee members or consultants experienced in the specific occupation.

Finally, the last page of our task inventories included questions about personal characteristics, such as desirable work habits, and whether handicapped persons could successfully perform the particular job. Some of the responses were especially helpful in pointing out to the test developers some attitudes and behaviors that should be tested. Although we felt the universe had been covered in our task inventories, blanks were left at the end of each section of the questionnaire to encourage respondents to add any overlooked tasks. Most additions, however, were found to be specific to a respondent's particular job situation.

A word of caution! This is <u>not</u> the only way to conduct a survey of tasks and analyze data. Any method that seems reasonable for your situation and that is consistent, clear, and methodical should work. We present this information as a guide that you are encouraged to adapt or modify.

Determine Task Priorities

Everything you've done on task analysis has been accomplished for the purpose of determining task priorities. Which tasks are <u>most</u> important to getting the job done? The answer to that question becomes the list of task priorities on which existing competency measures will be reviewed or new measures will be developed.

In our analysis of hundreds of responses to the various task inventory lists, we discovered that certain tasks were rated consistently as critical and were performed regularly and often. These tasks had overall ratings of 5.0 or higher (as determined by the saliency formula described previously). Such tasks should be included in the final list of competencies. Conversely, other tasks clearly fell along the wayside, with overall ratings of 3.0 or less. These were then deleted. For tasks that seemed marginal (i.e., around 4.0), we suggest you look closely at the supervisors' overall rating or check with knowledgeable advisors. Sometimes, "borderline" tasks appeared redundant--tasks had already been included to cover that particular skill adequately--and they were dropped. "When in doubt, do not leave it out" may be a wise rule, however, especially if there is some concern about having enough tasks (about 50) for test development.

Finally, rebuild the list of surviving tasks by:

- logically grouping separate tasks under major headings of duties;
- reviewing wording of task statements for clarity and consistency; and
- ensuring that tasks are comparable as to level of detail (may mean combining task statements).

At this stage, you may want to ask your advisory panel to review critically the revised list of task statements. An expert review should result in an outline of competencies that is comprehensive and provides a useful tool for the next step.

Review Existing Tests

You've now arrived at a point where you know which set of tasks you'll be using to either review existing tests or develop your own measures. Many different competency tests have been developed over the last several years. You may not have to develop your own if you carefully screen available measures and find they meet your needs. Currently, there are 49 occupational competency tests nearing completion. The tests and test developers are listed by occupational area in Table 2 on the following pages. In addition to those tests, the Appendices section provides references to other efforts in occupational competency measurement. Standard test references should also be looked at, such as the Mental Measurement Yearbook (Buros, 1978) and others included in the Recommended References on page 45.

TABLE 2

VOCATIONAL COMPETENCY TESTS NEARING COMPLETION

AREA/TEST *	AIR	N	FL
AGRICULTURE:			
Agricultural Chemicals Applications Technician	X		
Agricultural Mechanics		X	
Farm Equipment Mechanic	X		
Greenhouse Grower			X
Horticulture		X	
Nursery Worker			X
Tractor Mechanic			X
BUSINESS AND OFFICE:			
Accounting/Bookkeeping		X	
Clerk Typist			X
Computer Operator	X		
General Office		X	
Secretary (includes Stenographer module)			X
Word Processing Specialist	X		
DISTRIBUTIVE EDUCATION:			
Apparel Sales	X		
Fabric Sales	X		
General Merchandising		X	
Grocery Clerk	X		
Hotel (Motel) Front Office	X		
Salesperson, Parts			X
HEALTH:			
Dental Assistant	X		
Hospital Ward Clerk			X
Nursing Aide			X
Physical Therapist Assistant	X		
Practical Nursing Occupations		X	

(continued)

*AIR - The American Institutes for Research Vocational Competency Measures Project
N - NOCTI Student Occupational Competency Achievement Testing Program
FL - Florida Occupational Achievement Tests

(See Appendices for addresses.)

TABLE 2 (continued)

AREA/TEST	AIR	N	FL
HOME ECONOMICS:			
Child Care Worker			X
Commercial Cook			X
Custom Sewing	X		
Fashion Construction Services		X	
Restaurant Service (Waiter, Waitress, Cashier)	X		
TECHNICAL:			
Electronics Technician	X		
Wastewater Treatment Technician	X		
Water Treatment Technician	X		
TRADE AND INDUSTRY:			
Auto Body Repair		X	
Auto Mechanics		X	
Bricklayer		X	
Bricklayer (Construction)			X
Carpenter	X		
Construction Electricity (House)		X	
Diesel Mechanic	X		
Drafting		X	
Heating and Air Conditioning		X	
Industrial Electronics		X	
Machine Trades		X	
Plumbing		X	
Printing		X	
Radio/Television Repair		X	
Refrigeration		X	
Small Engine Repair		X	
Welding		X	

In reviewing available competency measures, you will naturally look at comprehensiveness--does the test cover all the duties and tasks you've identified as important? What areas are inadequately measured, or what duties are superfluous to entry-level testing needs? For example, you may have unearthed a retail clerk test that meets your competency requirements adequately except that it slights customer relations. You might consider using that test, but, in addition, developing a customer relations test to use as a companion measure.

Reviewing existing measures also means paying close attention to test bias. Tests must be fair, sensitive to, and usable with special populations--minorities, limited-English proficiency, women, the handicapped. Carefully study the technical manual for the test to determine whether the test has been tried out with special populations, and what evidence is available on test reliability and validity.

Then, if all else fails, you may be faced with the creative and rather complex adventure of developing your own competency measures. You might first consider asking your advisory panel to corroborate your decision to develop a test; then enlist their aid in the development process. They can help you by suggesting performance measures for specific tasks, and by recommending individuals who could develop test items for a paper-and-pencil test. This information is necessary for the work described in the third module of this series, Developing Vocational Competency Measures.

Individual Study Activities

1. If possible, obtain an example of an occupational competency test (check V-TECS Progress and Information Reports, NOCTI Annual Reports, Buros, and other general test reference books). Review the test as if you were deciding whether to use it in your district. Briefly note where you feel gaps, redundancy, unclear or biased wording, etc., exist. Prepare a short critique of the selected test for a presentation to the class.

2. With a partner, select one occupation from the DOT. Then, individually, develop a series of task statements for the selected job. With your partner, compare your task statements, looking carefully at the discrepancies. Finally, combine the two, rearranging and grouping the tasks logically under major duties and clarifying the task statements.

Discussion Questions

1. A major problem in developing competency-based vocational curriculum and achievement measures is reaching agreement on what competencies ought to be taught and how those competencies can be measured. Consider your district or state requirements and local union standards for a selected occupational program in a discussion of selecting competencies to be measured.

2. For the same occupation(s) considered above (or others), discuss the constraints or flexibility necessary in developing competency measures for the following special student/employee groups:

    - disadvantaged
    - limited-English proficiency
    - handicapped
    - displaced homemakers

Group Activities

1. For this activity, individual class members are responsible for inviting employers and educators to speak to the class on their needs for easy-to-administer, comprehensive, unbiased competency tests. Recruit a panel from the following categories of resource people: local director or dean of vocational education; district or area curriculum coordinator; supervisors and personnel staff from local or area employers; occupational specialist from district or state; trade union representatives; and so on. Formulate questions prior to the panel presentations on topics such as: who and how to decide whether to use competency measures; how to determine the competencies that should be tested; relating actions for competency measures to school programs versus employer demands; improving occupational programs; and using competency tests to screen potential employees.

2. Assume that your district plans to develop a competency test for an occupation in an expanding job market in your state. Select the occupation for which you will outline an action plan listing the duties and responsibilities that should be covered to develop the test. Divide into small groups, with each group drafting one section of the outline:

   a. Selecting and managing an advisory committee

   b. Developing a task inventory

   c. Verifying task importance

   d. Determining task priorities

   (Depending on class size and the time available for this activity, the groups can tackle smaller sections of work as divided in this module.) Although you most likely will not be able to do a full-scale analysis of desired competencies, your end-product as a class should be a workable, practical guide to fit your district, school, or state needs.

Summary

This module has described systematic and logical procedures for developing a list of competencies for use in developing or reviewing vocational competency measures. Whatever their background and experience in formal testing, most vocational educators will find themselves increasingly involved in competency testing. Therefore, it is important to know that the steps needed to select competencies are similar for both reviewing existing tests and for developing new measures. Those steps are:

- Establish a working advisory group.
- Develop a comprehensive task inventory.
- Verify the tasks by surveying employers.
- Determine task priorities by analyzing survey data.
- Outline revised task statements for use in reviewing or developing competency measures.

SUMMARY

APPENDICES

Sources of Information about Job and Task Analysis

- National Center for Research in Vocational Education
  The Ohio State University
  1960 Kenny Road
  Columbus, OH 43210

- Centers of the National Network for Curriculum Coordination in Vocational Education (NNCCVTE):

  William Daniels, 1982 NNCCVTE Chairperson and Director
  Northwest Curriculum Coordination Center
  Building 17, LS-10
  Airdustrial Park
  Olympia, WA 98504
  206/753-0879

  Rebecca S. Douglass, Director
  East Central Curriculum Coordination Center
  Sangamon State University, E-22
  Springfield, IL 62708
  217/786-6375

  Lawrence F. H. Zane, Director
  Western Curriculum Coordination Center
  University of Hawaii
  1776 University Avenue
  Wist Hall 216
  Honolulu, HI 96822
  808/948-7834

  Roy Hinrichs, Director
  Southeast Curriculum Coordination Center
  Mississippi State University
  P.O. Drawer DX
  Mississippi State, MS 39762
  601/325-2510

  Bob Patton, Director
  Midwest Curriculum Coordination Center
  Curriculum & Instructional Materials Center
  1515 West 6th Avenue
  Stillwater, OK 74074
  405/377-2000

  Joseph Kelly, Director
  Northeast Curriculum Coordination Center
  Bureau of Occupational & Career Research Development
  Division of Vocational Education
  225 West State Street
  Trenton, NJ 08625
  609/292-5850

- American Association of Community and Junior Colleges
  1 Dupont Circle, N.W.
  Washington, DC 20036

- U.S. Department of Labor

- U.S. Department of Defense

- Mid-America Vocational Curriculum Consortium
  1515 West Sixth Avenue
  Stillwater, OK 74074

- Vocational-Technical Education Consortium (V-TECS)
  Southern Assoc. of Colleges & Schools
  795 Peachtree Street, N.E.
  Atlanta, GA 30308

State Agencies and Consortia
Developing Occupational Competency Measures

- Florida Department of Education
  Bureau of Vocational Research,
  Dissemination and Evaluation
  Knott Building
  Tallahassee, FL 32301

- National Occupational Competency Testing Institute
  45 Colven Avenue
  Albany, NY 12206

Self-Check

GOAL 1

1. What is the foundation of a good vocational competency test?

2. How can advisory groups help in the development of competency measures?

3. Describe the relationship between job, duties, and tasks.

4. What parts make up a clear, concise task statement? Give one example of a task statement.

5. State four methods for collecting and verifying task information

GOAL 2

1. When selecting tasks to be covered in a vocational competency test, what are the two most important pieces of information to analyze?

2. What other types of information should be compiled during task verification in order to provide background information for item development?

3. When you have selected those tasks that should be included in a vocational competency test, what two steps should be accomplished before you start to develop the test?

4. Tests of all types should be carefully screened for bias against which four vocational education subpopulations?

Self-Check Responses

GOAL 1

1. Job and task analyses

2. • Review and author task statements and test items

   • Provide resources on existing task analyses and measures, industry needs

   • Increase access to employers for verifying task statements

   • Provide detailed information on specific knowledge, occupational skills, abilities

3. Job - a group of related duties and tasks done by or assigned to one employee

   Duty - collection of tasks describing a group of closely related actions

   Task - distinct measurable action with a specific purpose

4. Action verb, object, qualifying phrase

5. Interviews, questionnaires, observation, document review

GOAL 2

1. Information on task importance and frequency of performance

2. Information on:

   • critical factors in task performance
   • task difficulty
   • criteria for judging adequacy of performance
   • desirable work habits
   • handicapped persons that have performed the job successfully

3. • Have the task list reviewed by your advisory panel.

   • Carefully review available tests to determine if they tap all or some of the competencies identified in your task verification.

4. Disadvantaged, handicapped, limited-English proficiency, women, and displaced homemakers

Recommended References

Abramson, T., Tittle, C.K., & Cohen, L. (Eds.). Handbook of vocational education evaluation. Part III. Beverly Hills, Calif.: Sage, 1979.

Buros, O.K. The eighth mento- measurement yearbook, Vol. II. Highland Park, N.J.: The Gryphon Press, 1978.

Dictionary of occupational titles. Bureau of Labor Statistics, U.S. Department of Labor.

Handbook for analyzing jobs. Washington, D.C.: U.S. Department of Labor, Manpower Administration, 1972.

Mager, R.F., & Beach, K.M. Developing vocational instruction. Belmont, Calif.: Fearon Publishers, 1967.

Melching, W.H., & Borcher, S.D. Procedures for constructing and using task inventories. Columbus, Ohio: Ohio State University, Center for Vocational and Technical Education, March 1973.

Primoff, E.S. How to prepare and conduct job element examinations. Washington, D.C.: U.S. Civil Service Commission, Personnel Research and Development Center, 1975.